

TENNESSEE BIODIVERSITY PROJECT: The Horror of Snake Fungal Disease for Tennessee Snakes and How You Can Help

by Gregg Elliott, Josh Campbell, Don Walker, Chris Simpson

Here's something strange that people in middle and eastern Tennessee have begun to see: rattlesnakes coming out to sun themselves on rocks in the dead of winter. For a rattler that is supposed to be hibernating underground through the coldest part of the year, that can be deadly.

In fact, these snakes are in danger from a new pathogen that began spreading in the U.S. a little over a decade ago. It goes by the mild name Snake Fungal Disease (SFD), but there is nothing mild about the effects of this fungal pathogen in snakes.

Native Tennessee snakes infected with the *Ophidiomyces ophiodiicola* pathogen develop ulcerated and/or eroded skin, incomplete sheds, large nodules on the head or other parts of the body, and severely malformed heads. They may appear malnourished or lethargic and display unusual behaviors, such as basking at unusual times.

Mortality associated with SFD infections is likely the result of complications of the infection rather than direct fungal damage, including impacts to vision, sense of smell, and infrared sensing, which in turn affect their ability to find and capture prey. Many of these snakes likely die of starvation.

The Timber Rattlesnake indirectly benefits humans by keeping Lyme disease in check. By consuming rodents—the primary carriers of ticks—rattlers remove from 2,500 to 4,500 ticks from the environment annually.

Why care about snakes?

If rattlesnakes are not high on your list of conservation concerns, consider this: a [2013 study](#) conducted by researchers at the University of Maryland found that the Timber Rattlesnake indirectly benefits humans by keeping Lyme disease in check. How do they do that? The researchers estimated the number of mice and



A healthy rattlesnake



The SFD-infected scale of a Timber Rattlesnake.



The [Common Dog Tick](#), carrier of Rocky Mountain Spotted Fever in Tennessee-by Dendorica cerulea via Flickr Creative Commons. Snake photos above by Matthew Grisnik, Tennessee Tech University.

other small mammals the snakes consume, and matched that with information on the average number of ticks each small mammal carried. The results showed that each Timber Rattler removed 2,500-4,500 ticks from their environment annually.

Tennessee is home to all four species of disease-carrying ticks: the Black Legged tick, Lone Star tick, American Dog tick, and Gulf Coast tick. In addition to Lyme, these ticks carry other diseases that are more prevalent in Tennessee, such as Rocky Mountain Spotted Fever.

Snakes in general are important to our ecosystems. Dr. Don Walker is researching aspects of Snake Fungal Disease at Tennessee Technological University (TTU). He points out, "Most people are familiar with the story of how wolves, when reintroduced into Yellowstone National Park in the mid-1990s, really revived the Yellowstone ecosystem by bringing populations of elk and deer down to more sustainable levels. Like wolves, snakes have a similar ecosystem role of exerting a top-down regulating effect on rodent populations."



A shedding Black Rat Snake with SFD.

Conservation partners and citizen scientists unite to meet the challenge of SFD

Biologists first confirmed SFD in Tennessee in 2012 in Dekalb County, although it's highly likely that the disease may have been present prior to this. Dr. Walker believes the fungus may have been present in the soil for a long time.

The impacts of SFD go far beyond Timber Rattlesnakes in Tennessee, with 14 snake species in 15 counties currently affected.

The impacts of SFD go far beyond Timber Rattlers, as evidenced by the results of a multi-state effort to aid conservation of snake species of greatest conservation need that are threatened by this emerging fungal skin disease. In 2013, TWRA and researchers from Middle Tennessee State University (MTSU), Cumberland University (CU), and Univ. of Tennessee, Knoxville (UTK) collected samples from multiple populations of Timber Rattlesnakes and other snake species to ascertain the presence of *O. ophiodiicola*. Additional projects at TTU have also investigated physiologic and behavioral responses of snakes to this disease, as well as the fungal pathogen's current geographic range.



An early SFD infection showing in the scutes of a Timber Rattlesnake. Both photos above by Matthew Crisnik, TTU.

That is where citizen science comes in. As of 2017, over 235 samples have been collected from 20 snake species in the state. In a [2018 monitoring report](#), TWRA summarizes that *O. ophiodiicola* has been confirmed in 14 snake species, including Common Garter Snake, Black Rat Snake, and Common King Snake. It is known from 16 Tennessee counties to date, but only 27 of Tennessee's 95 counties have been surveyed. This disease is still uncommon enough that biologists get a lot of value from any new record of possible SFD infection in snakes.

If you are a snake enthusiast or wildlife watcher, please help us!

TWRA encourages the public to submit records of any potential occurrences of the disease in Tennessee's snakes to aid the efforts surrounding SFD. Any record submitted should contain the following information:

- The date the observation is made
- The exact location of the observation. GPS coordinates (dd.ddddd) must accompany any locality information submitted. There are many ways to [obtain coordinates using a smart phone](#).
- The species of snake observed.
- The symptoms observed, to include unusual behavior.
- Photographs of both the snake and symptoms, including any lesions, bumps or scabs observed.



The **Common Garter Snake**, one of 14 species known to be affected by SFD in Tennessee-by Greg Schlechter, Flickr CC.

Please report your sightings of SFD to the appropriate regional office:

Statewide Office, Nashville

Roger Applegate, Wildlife Population Biologist
615-781-6616/Roger.Applegate@tn.gov

Region I Office, Jackson

Rob Colvin, Wildlife Biologist
731-423-5725/Rob.Colvin@tn.gov

Region II Office, Nashville

Josh Campbell, Wildlife Diversity Coordinator
615-781-6626/Josh.Campbell@tn.gov

Region III, Crossville

Chris Simpson, Wildlife Diversity Coordinator
931-484-9571/Chris.Simpson@tn.gov

Region IV, Morristown

Scott Dykes, Wildlife Diversity Coordinator
1-800-332-0900, ext. 112/Scott.Dykes@tn.gov

